

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA7 | Colne Valley

Operational assessment (SV-004-007)

Sound, noise and vibration

November 2013

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Department
for Transport

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Appendix SV-004-007

Environmental topic:	Sound, noise and vibration	SV
Appendix name:	Operation assessment	004
Community forum area:	Colne Valley	007

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1 Introduction

1.1 Structure of the sound, noise and vibration appendices

- 1.1.1 The sound, noise and vibration appendices comprise four sections. The first of these details the methodology used (Appendix SV-001-000) and relates to the sound, noise and vibration assessment for all community forum areas (CFA).
- 1.1.2 For the Colne Valley community forum area (CFA07), the other three sections are as follows:
- baseline sound, noise and vibration (Appendix SV-002-007);
 - construction sound, noise and vibration (Appendix SV-003-007); and
 - operational sound, noise and vibration (Appendix SV-004-007) (this appendix).
- 1.1.3 The outcomes of this assessment are summarised in Volume 2: CFA07 Report, Chapter 11 Sound, Noise and Vibration.
- 1.1.4 Maps referred to throughout the sound, noise and vibration appendices are contained in the Volume 5 sound, noise and vibration map book.
- 1.1.5 This appendix presents the likely noise and vibration impacts, effects and significant effects arising from the operation of the Proposed Scheme for the Colne Valley area on:
- people, primarily where they live ('residential receptors') in terms a) individual dwellings and b) on a wider community basis, including any shared community spaces; and
 - community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'.
- 1.1.6 The assessment of likely impacts, effects and significant effects from operational noise and vibration on agricultural, community, ecological or heritage receptors and the assessment of tranquillity are presented in the following documents within Volume 5:
- Agriculture, forestry and soils Appendix AG-001-007
 - Community Appendix CM-001-007
 - Ecology Appendix EC-005-002
 - Heritage Appendix CH-003-007
 - Landscape and Visual Appendix LV-001-007

1.2 Evaluation of impacts and effects

- 1.2.1 This appendix provides a quantitative assessment of operational noise and vibration impacts and effects and a qualitative assessment of likely significant effects, based on the impacts and effects identified and other local context information consistent with the scope and methodology defined for the Proposed Scheme.

- 1.2.2 Indirect effects arising from permanent changes in traffic patterns on the existing road and rail networks as a consequence of the Proposed Scheme are also reported in this appendix, where they would occur within the study area as defined in Volume 5: Appendix SV-001-000.
- 1.2.3 Route-wide impacts, effects and significant effects associated with noise or vibration from the operation of the Proposed Scheme are reported in Volume 3.
- 1.2.4 Off-route effects of noise or vibration arising from the operation of the Proposed Scheme, including those likely to arise from permanent changes in traffic patterns on roads or railways outside of the study area for direct effects are reported in Volume 4.
- 1.2.5 In undertaking the assessment of sound, noise and vibration, consistent with EIA Regulations and emerging National Planning Practice Guidance¹ a differentiation between impacts effects, adverse effects and significant effects is made. Further information is provided in Volume 5: Appendix SV001-000.
- 1.2.6 The assessment of impacts has been undertaken at assessment locations that are representative of a number of dwellings or other sensitive receptors. The Assessment Locations employed in this assessment are presented on map series Sv-02 in the CFA07 Volume 5 sound, noise and vibration map book.

¹ National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk> ; refer to the table summarising noise exposure hierarchy

2 Scope, assumptions and limitations

2.1 Regional and local policy guidance

2.1.1 The policy framework for sound, noise and vibration is set out in Volume 1 and in Appendix SV-001-000. As part of the engagement with local authorities through the Planning Forum Sub Group (Acoustics), information regarding any specific local planning guidance in respect of noise and vibration has been requested. Whilst no information has been received for this study area via the Planning Forum Sub Group (Acoustics) the following local policy guidance on noise and vibration has been identified:

- Three Rivers Local Plan – 2002;
- South Bucks District Local Plan - March 1999; and
- The Local Plan for Chiltern District - Sept 1997.

2.1.2 This guidance has been considered as part of formulating the detailed application of the impact and significance criteria set out in Volume 5: Appendix SV-001-000.

2.2 Engagement

2.2.1 Details of engagement on a route-wide basis with the local and county authorities' Environmental Health Practitioners via the Planning Forum Sub Group - Acoustics, is set out in Volume 1, Section 8.

2.2.2 Engagement with communities has been via the Community Forums, as set out in Volume 1. In respect of sound, noise and vibration the following discussions have taken place:

- general discussions in respect of local issues, including possible ways to avoid and mitigate the potential impacts of noise or vibration
- September / October 2012; a specific presentation about sound, noise and vibration with discussion afterwards with one of the project team specialists;
- November / December 2012; specific request for the Community Forum to propose baseline sound monitoring locations;
- January / February 2013; feedback to the Community Forum on any proposed baseline monitoring locations; and
- verbal / written response to questions on sound, noise and vibration.

2.3 Methodology

2.3.1 The methodology used for the assessment of airborne sound, ground-borne sound and vibration impacts and the determination of significant effects is defined in the Scope and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1), is clarified in a number of areas by the SMR addendum (Volume 5: Appendix CT-001-000/2). Further information is contained in Volume 5: Appendix SV-001-000.

2.4 Assumptions

- 2.4.1 Route-wide assumptions are outlined in Volume 1, Section 8, and are further detailed in Volume 5: Appendix SV-001-000. Local assumptions that apply to the assessment of operational sound noise and vibration within this CFA are set out in Volume 2: Report 07.

2.5 Local Limitations

- 2.5.1 In this area, there are a number of locations where the land or property owners did not permit baseline sound level monitoring to be undertaken at their premises. However, sufficient information has been obtained to undertake the assessment. Further information is provided in Volume 5: Appendix SV-002-000.

3 Environmental baseline

3.1 Existing baseline

- 3.1.1 Baseline sound level data has been collected at locations representative of the airborne sound-sensitive receptors. The existing and future baseline airborne sound levels derived from these measurements are included within Table 3. Details of the baseline data collection and the methodology are given in Volume 5: Appendix SV-001-000 and specifically for this study area in Volume 5: Appendix SV-002-007.
- 3.1.2 The majority of receptors adjacent to the line of the route are not currently subject to appreciable vibration and therefore vibration at all receptors has been assessed using the absolute vibration criteria as described in Volume 5: Appendix SV-001-000.

3.2 Future baseline

- 3.2.1 The assessment is based upon the predicted change in sound levels that result from the Proposed Scheme. The assessment initially considered a reasonable worst case (that would overestimate the change in levels) by assuming that sound levels would not change from the existing baseline year of 2012/2013. Where significant effects were identified on this basis, the effects have been assessed using the baseline year of 2026 to coincide with the proposed start of passenger services. The future baseline is for the sound environment that would exist in 2026 without the Proposed Scheme.

4 Effects arising during operation

4.1 Introduction

4.1.1 The assessment is reported first for ground-borne sound and vibration and then for airborne sound. Under each of these headings, the results of the quantitative identification of impacts and effects are presented. This is followed by the identification of significant effects and the evidence used to support these conclusions.

4.1.2 The structure of this assessment report is:

- Avoidance and mitigation measures
- Quantitative identification of impact and effects
 - Ground-borne sound and vibration
 - Residential
 - Non-residential
 - Airborne sound
 - Residential
 - Non-residential
- Assessment of impacts and effects
 - Residential receptors: direct effects – dwellings
 - Residential receptors: direct effects – communities
 - Residential receptors: indirect effects
 - Non-residential receptors: direct effects
 - Non-residential receptors: indirect effects
 - Cumulative effects from the proposed scheme and other committed development.

4.2 Avoidance and mitigation measures

4.2.1 These are set out in Volume 2: Report 07.

4.3 Quantitative identification of impacts and effects

Ground-borne sound and vibration

4.3.1 Assessment locations defined for the quantitative assessment of impacts are shown on map series SV-02 in the CFA07 Volume 5 sound, noise and vibration map book.

4.3.2 For each Assessment Location, the assessment results for residential and non-residential receptors are presented in Table 1. Explanation of the information in Table 1 is provided in Appendix SV-001-000, with the following additional notes.






B	For non-residential receptors further detail about the type of effect is set out in the text of Volume 5: Appendix SV-001-000.
NA	Type of effect - Generally no adverse effect
A	Type of effect - Adverse effect
S	Type of effect - Significant adverse effect
VDV	Vibration Dose Value
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000).
^	The impact methodology has identified a potential significant effect at this receptor which based upon further qualitative information is not considered to be a likely significant effect. Please refer the end of this Appendix for further information.
	Where the significant effect column is highlighted in pink, then a significant effect is identified at the referenced residential community area, or individual receptor.
	Yellow denotes a low ground-borne noise impact or a minor ground-borne vibration impact
	Orange denotes a medium ground-borne noise impact or a moderate ground-borne vibration impact
	Red denotes a high ground-borne noise impact or a major ground-borne vibration impact
	Dark red denotes a very high ground-borne noise impact

Table 1: Ground-borne sound and vibration levels, noise and vibration impacts and effects

Assessment location		Impact criteria				Significance criteria								Significant effect
		Ground-borne sound level dB L _{pASmax}	VDV m/s ^{1.75} Daytime (07:00 - 23:00)	VDV m/s ^{1.75} Night time (23:00 – 07:00)	% increase or decrease in VDV	Number of impacts represented	Type of effect	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation effect	
ID	Area represented													
389096	Denham Way, Denham	-	0.00	0.00	-	2	NA	R	T	-	-	-	-	-
711001	Hillingdon Outdoor Activities Centre, Harvil Road (General Commercial)	-	0.00	0.00	-	1	B	G ₄ /V ₃	T	-	-	-	-	-

Impact summary

- 4.3.3 The operational groundborne sound and vibration impacts identified in Table 1 are summarised in Table 2.

Table 2: Ground-borne sound and vibration impacts and effects at residential and non-residential receptors

	Number of ground-borne sound impacts			
	Low	Medium	High	Very High
Residential properties	0	0	0	0
Non-residential properties	0			0
	Number of ground-borne vibration impacts			
	Minor	Moderate	Major	Risk of building damage
Residential properties	0	0	0	0
Non-residential properties	0			0

Airborne sound: direct impacts and effects

- 4.3.4 The direct effects from the operation of the Proposed Scheme as well as any new, amended or altered roads or railway lines, which are identified as part of the scheme, are presented in Table 3.
- 4.3.5 The assessment information, impact criteria and significance criteria for the assessment of the incorporated mitigation case at residential and non-residential receptors are presented in Table 3. The results should be considered in conjunction with the information contained in map series Sv-02 in the CFA07 Volume 5 sound, noise and vibration map book.
- 4.3.6 Explanation of the Table 3 information is provided in Volume 5: Appendix SV001-000, with the following additional notes.



Where the significant effect column is marked, then a significant effect is identified at the referenced group of dwellings, or individual residential or non-residential receptor.

Yellow denotes a minor impact at a residential building – a change is of 3-5 dB

Orange denotes a moderate impact at a residential building – a change is of 5-10 dB

Red denotes a major impact at a residential building – a change is of >10 dB

* Day - $L_{pAeq,07:00-23:00}$

** Night - $L_{pAeq,23:00-07:00}$

*** Max - L_{pAFmax} In the Proposed Scheme only column, two values are presented. The first is the value for the HS2 mitigated train and the second is the value for the TSI compliant train. For further information refer to Volume 5: Appendix SV-001-000.

**** Where the Proposed Scheme modifies an existing source, i.e. road or railway realignments, the *Proposed Scheme only* level in the table includes the sound from the modified source. In this situation the *Do something (Opening year baseline + Year 15 traffic)* level has been corrected so as to not double count the sound associated with the road or railway on its new and existing alignment.

A Adverse effect

B For non-residential receptors further detail about the type of effect is set out in the text of Appendix SV-001-000.

CD	Committed Development. The value in brackets in the number of impacts represented column is the value with the committed development.
G	(G1) Theatres, large auditoria and concert halls, (G2) Sound recording and broadcast studios, (G3) Places of meeting for religious worship, courts, cinemas, lecture theatres, museums and small auditoria or halls, (G4) Schools, colleges, hospitals, hotels and libraries, and (G5) Offices and general commercial premises
H	High existing ambient sound level. Defined as $>65\text{dB}_{\text{Aeq, day}}$ and/or $>55\text{dB}_{\text{Aeq, night}}$
L	Low existing ambient sound level. Defined as $<42\text{dB}_{\text{Aeq, day}}$ and/or $<32\text{dB}_{\text{Aeq, night}}$
LD	Landscape receptor
M	Mooring (temporary)
NA	Generally no adverse effect
NI	The receptor is predicted to qualify for mitigation, which shall be provided to the specification defined in the Noise Insulation (Railways and other Guided Rail Systems) Regulations 1996
R	Residential
RM	Residential mooring
S	Significant adverse effect
U	Unacceptable adverse effect
#	A change of 3dB or greater has been identified however, the assessment methodology only defines an impact where the absolute sound level from the Proposed Scheme is greater or equal to 50 dB $L_{\text{pAeq, 23:00-07:00}}$ during the daytime or 40 dB $L_{\text{pAeq, 07:00-23:00}}$ at night. At the receptor denoted the absolute level condition is not met and therefore no impact is identified.
~	The forecast adverse effects are not considered to be significant on a community basis (further information on methodology is provided in Volume 5: Appendix SV-001-000).
\$	A change of 3dB or greater has been identified however, the impact methodology for non-residential receptors includes a screening criteria for G3 building use of 50 dB $L_{\text{pAeq, 07:00-23:00}}$, for G4 building use 55 dB $L_{\text{pAeq, 07:00-23:00}}$ and 45 dB $L_{\text{pAeq, 23:00-07:00}}$, for G5 building use 55 dB $L_{\text{pAeq, 07:00-23:00}}$. At the receptor denoted the screening criteria is not met and therefore no impact is identified. Further information is provided in Volume 5: Appendix SV-001-000.
^	The impact methodology has either identified an impact at a receptor which based upon further qualitative information does not give rise to a significant effect. Further information is provided at the end of this Appendix.

Table 3: Operational airborne sound level, noise impacts and effects

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
383893	Wyatt's Covert, Denham	56	47	70/72	55	48	59	59	51	4	2	A	7	R	T	-	-	-	-	OSV07-C02
384372	North Orbital Road, Denham	58	49	72/74	55	48	59	60	52	5	3	A	13	R	T	-	-	-	-	OSV07-C02
384374	Tilehouse Lane, Denham	50	41	65/67	50	44	50	53	45	3	2	A	3	R	T	-	-	-	-	OSV07-C03
384424	Tilehouse Lane, Denham	51	42	63/67	50	48	59	54	49	4	1	A	16	R	T	-	-	-	-	OSV07-C02
384540	Queen Mothers Drive, Denham Garden Village	43	34	54/57	49	40	48	50	41	1	1	NA	23	R	T	-	-	-	-	
384678	Patrons Way West, Denham Garden Village	42	33	53/56	49	40	48	50	41	1	1	NA	14	R	T	-	-	-	-	
384701	Patrons Way East, Denham Garden Village	45	36	57/59	49	40	48	50	42	2	1	NA	92	R	T	-	-	-	-	
384843	Patrons Way East, Denham Garden Village	44	35	57/61	49	42	59	50	43	1	1	NA	36	R	T	-	-	-	-	
384928	Patrons Way East, Denham Garden Village	47	38	59/62	55	49	59	55	49	1	0	NA	24	R	T	-	-	-	-	
384986	Patrons Way East, Denham Garden Village	46	37	58/62	50	43	59	51	44	2	1	NA	65	R	T	-	-	-	-	
385086	Wyatt's Covert, Denham	54	45	67/70	55	48	59	58	50	3	2	A	12	R	T	-	-	-	-	OSV07-C02
385188	Chairmans Walk, Denham Garden Village	48	39	59/62	52	45	59	53	46	2	1	NA	6	R	T	-	-	-	-	
385470	Patrons Way West, Denham Garden Village	46	37	58/60	49	40	48	51	42	2	2	NA	26	R	T	-	-	-	-	
385531	Patrons Way West, Denham	46	36	57/60	49	40	48	50	42	2	1	NA	55	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
	Garden Village																			
385939	Marish Lane, Denham	42	32	53/55	50	43	59	50	43	1	0	NA	6	R	T	-	-	-	-	
387494	Green Tiles Lane, Denham	41	32	52/54	54	47	61	54	48	0	0	NA	110	R	T	-	-	-	-	
387745	Denham Green Lane, Denham	42	32	52/55	53	46	59	53	46	0	0	NA	35	R	T	-	-	-	-	
387787	Penn Drive, Denham	39	30	50/52	54	47	61	54	47	0	0	NA	113	R	T	-	-	-	-	
388230	Nightingale Way, Denham	40	31	51/53	54	47	61	54	47	0	0	NA	10	R	T	-	-	-	-	
388449	Tilehouse Lane, Denham	40	30	51/53	54	47	61	54	47	0	0	NA	3	R	T	-	-	-	-	
388708	Woodhurst Drive, Denham	44	35	56/60	49	40	48	50	41	1	1	NA	26	R	T	-	-	-	-	
388957	Woodhurst Drive, Denham	43	33	54/57	49	40	48	50	41	1	1	NA	24	R	T	-	-	-	-	
389222	Wyatt’s Covert, Denham	55	46	69/72	55	48	59	58	50	3	2	A	28	R	T	-	-	-	-	OSV07-Co2
389294	Tilehouse Lane, Denham	47	38	59/62	50	43	59	52	44	2	1	NA	3	R	T	-	-	-	-	
389414	Halings Lane, Denham	45	36	57/60	50	43	59	51	44	1	1	NA	4	R	T	-	-	-	-	
389429	Tilehouse Lane, Denham	57	48	70/73	51	45	50	58	50	7	5	A	1	R	T	-	-	-	-	OSV07-Co3
390171	Moorfield Road, Denham	42	33	54/58	44	40	45	46	41	2	1	NA	105	R	T	-	-	-	-	
390213	Savay Close, Denham	45	35	56/60	45	39	48	48	40	3	2	NA	58	R	T	-	-	-	-	#
390764	Savay Lane, Denham	49	40	61/65	46	39	48	51	43	5	3	A	6	R	T	-	-	-	-	OSV07-Co1
390840	North Orbital Road, Uxbridge	42	33	53/56	57	51	59	57	51	0	0	NA	119	R	T	-	-	-	-	
391014	Link Way, Denham	45	36	55/58	53	46	59	53	46	1	0	NA	166	R	T	-	-	-	-	
391133	Savay Lane, Denham	46	37	57/61	53	46	61	53	46	1	1	NA	21	R	T	-	-	-	-	
391149	Denham Green Lane, Denham	44	34	54/57	50	43	59	51	44	1	1	NA	39	R	T	-	-	-	-	
391326	Savay Lane, Denham	51	42	63/67	46	39	48	52	44	6	5	A	6	R	T	-	-	-	-	OSV07-Co1

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
391389	Sheepcote Gardens, Denham	46	36	57/61	55	49	59	55	49	1	0	NA	33	R	T	-	-	-	-	
391607	Moorhall Road, Harefield	56	47	66/70	56	52	70	59	53	3	1	A	2	R	T	-	-	-	-	~
392100	Peerless Drive, Harefield	49	40	59/62	49	43	45	52	45	3	2	A	33	R	T	-	-	-	-	#
392473	Broadwater Lane, Harefield	47	37	55/58	52	51	58	53	51	1	0	NA	38	R	T	-	-	-	-	
395266	Chalfont Lane, West Hyde	46	38	56/59	55	47	57	55	47	0	0	NA	2	R	T	-	-	-	-	
395380	The Hawthorns, Maple Cross	37	28	51/53	50	48	54	50	48	0	0	NA	14	R	T	-	-	-	-	
395447	Birch Drive, Maple Cross	36	27	50/53	50	48	54	50	48	0	0	NA	33	R	T	-	-	-	-	
396118	Longcroft Road, Maple Cross	34	26	48/51	50	48	54	50	48	0	0	NA	90	R	T	-	-	-	-	
396203	Buttlehide, Maple Cross	35	26	49/51	61	54	58	61	54	0	0	NA	26	R	T	-	-	-	-	
396888	Old Uxbridge Road, West Hyde	54	45	69/72	54	47	56	57	49	3	2	A	1	R	T	-	-	-	-	~
396945	Old Uxbridge Road, West Hyde	53	43	67/70	54	47	56	57	49	2	1	A	2	R	T	-	-	-	-	
396991	Old Uxbridge Road, Rickmansworth	44	35	57/59	55	47	57	55	47	0	0	NA	5	R	T	-	-	-	-	
397097	Old Uxbridge Road, West Hyde	43	34	54/57	53	46	57	54	46	0	0	NA	20	R	T	-	-	-	-	
397281	Old Uxbridge Road, Rickmansworth	41	33	52/55	51	43	57	51	44	0	0	NA	6	R	T	-	-	-	-	
397354	Old Uxbridge Road, West Hyde	43	35	54/56	61	53	68	61	53	0	0	NA	11	R	T	-	-	-	-	
397534	Old Uxbridge Road, Maple Cross & Mill End	41	33	51/53	61	53	68	61	53	0	0	NA	4	R	T	-	-	-	-	
399250	Park Lane, Harefield	45	36	59/61	52	51	58	53	51	1	0	NA	3	R	T	-	-	-	-	
399824	Jacks Lane, Harefield	43	33	55/58	52	51	58	52	51	0	0	NA	15	R	T	-	-	-	-	
401764	Harvil Road, Harefield	60	51	73/76	51	47	53	61	52	9	5	A	2	R	T	-	-	-	-	~

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
402028	Hillside, Harefield	50	41	60/63	49	45	48	53	46	4	1	A	19	R	T	-	-	-	-	~
402270	The Furrows, Harefield	48	38	57/60	52	38	47	53	41	1	3	NA	66	R	T	-	-	-	-	#
402669	Moorhall Road, Harefield	52	43	61/65	57	52	56	57	52	1	0	A	3	R	T	-	-	-	-	
402948	Truesdale Drive, Harefield	47	38	56/59	48	44	48	51	45	2	1	NA	79	R	T	-	-	-	-	
403127	Broadwater Gardens, Harefield	44	35	54/57	52	51	58	53	51	1	0	NA	159	R	T	-	-	-	-	
406098	Harvil Road, Ickenham	45	36	58/61	59	51	60	59	51	0	0	NA	2	R	T	-	-	-	-	
406180	The Drive, Ickenham	45	36	56/59	51	43	60	52	44	1	1	NA	6	R	T	-	-	-	-	
407707	The Drive, Ickenham	41	32	54/57	58	50	60	58	50	0	0	NA	14	R	T	-	-	-	-	
700365	Chalfont Lane, West Hyde	55	47	56/58	55	47	57	55	47	0	0	A	1	R	T	-	-	-	-	
700366	Old Uxbridge Road, Rickmansworth	44	35	55/58	55	47	57	55	47	0	0	NA	2	R	T	-	-	-	-	
700367	Old Uxbridge Road, Rickmansworth	45	36	58/61	55	47	57	55	47	0	0	NA	1	R	T	-	-	-	-	
700368	Tilehouse Lane, Denham	57	47	72/75	51	45	50	58	49	6	4	A	1	R	T	-	-	-	-	OSV07-Co3
700370	Uxbridge Road, Denham	62	52	79/81	65	58	61	66	59	2	1	S	2	R	T	H	-	-	NI	OSV07-D01
700371	North Orbital Road, Denham	59	50	73/75	55	48	59	60	52	6	4	A	3	R	T	-	-	-	-	OSV07-Co2
700372	Wyatts Covert Caravan Site, Denham	56	47	69/72	55	48	59	59	51	4	2	A	3	R	T	-	-	-	-	OSV07-Co2
700374	Moorhall Road, Harefield	54	45	64/68	58	53	70	59	54	2	1	A	2	R	T	-	-	-	-	
700375	Moorhall Road, Harefield	54	44	65/69	46	39	48	54	45	8	6	A	1	R	T	-	-	-	-	OSV07-Co1
701092	Hillside, Harefield	48	38	59/62	49	45	48	51	45	2	0	NA	12	R	T	-	-	-	-	
701093	Hillside, Harefield	49	40	58/62	49	45	48	52	45	3	1	A	22	R	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
701094	Dellside, Harefield	49	40	59/62	49	45	48	52	45	3	1	A	31	R	T	-	-	-	-	
701095	Peerless Drive, Harefield	51	41	60/63	50	43	45	53	45	3	2	A	12	R	T	-	-	-	-	~
701096	Priory Close, Harefield	47	37	57/60	49	43	45	51	44	2	1	NA	28	R	T	-	-	-	-	
701097	St. Marys Close, Harefield	45	36	54/57	52	51	58	53	51	1	0	NA	30	R	T	-	-	-	-	
701098	St. Marys Road, Harefield	43	34	53/56	52	51	58	53	51	1	0	NA	83	R	T	-	-	-	-	
711000	Horse & Barge Visitor Moorings	55	46	65/68	55	50	56	58	51	3	1	M	-	R	T	-	-	-	-	~
711048	Peerless Drive, Harefield	50	41	60/63	50	43	45	53	45	3	2	A	13	R	T	-	-	-	-	~
711049	Peerless Drive, Harefield	46	36	57/59	50	43	45	51	44	1	1	NA	42	R	T	-	-	-	-	
711050	Peerless Drive, Harefield	47	38	58/61	50	43	45	52	44	2	1	NA	16	R	T	-	-	-	-	
384424	Tilehouse Lane, Denham, (British Legion Club)	51	42	63/67	50	48	59	54	49	4	1	B	1	G5	T	-	-	-	-	
384701	Denham Garden Village (Post Office)	45	36	57/59	49	40	48	50	42	2	1	B	3	G5	T	-	-	-	-	
384986	Denham Medical Centre, Queen Mothers Drive (Health Centre)	46	37	58/62	50	43	59	51	44	2	1	B	1	G4	T	-	-	-	-	
387494	Penn Drive, Denham (Shopping)	41	32	52/54	54	47	61	54	48	0	0	B	1	G5	T	-	-	-	-	
387494	Denham Green Dental Practice (Dental Surgery)	41	32	52/54	54	47	61	54	48	0	0	B	1	G4	T	-	-	-	-	
387494	Penn Drive, Denham, (Office)	41	32	52/54	54	47	61	54	48	0	0	B	1	G5	T	-	-	-	-	
388230	Tilehouse County School, Denham (School)	40	31	51/53	54	47	61	54	47	0	0	B	1	G4	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
388708	Denham Green Lane, (General Commercial)	44	35	56/60	49	40	48	50	41	1	1	B	1	G5	T	-	-	-	-	
389194	Denham Grove, Tilehouse Lane, Denham (Hotel)	57	48	74/77	51	45	50	58	50	7	5	B	1	G4	T	-	-	-	-	OSV07-No1
389294	Tilehouse Lane, Denham, (General Commercial)	47	38	59/62	50	43	59	52	44	2	1	B	6	G5	T	-	-	-	-	
389414	Station Parade, Denham, (General Commercial)	45	36	57/60	50	43	59	51	44	1	1	B	1	G5	T	-	-	-	-	
390171	Station Parade, Denham, (General Commercial)	42	33	54/58	44	40	45	46	41	2	1	B	2	G5	T	-	-	-	-	
390213	Scout Hall, Savay Close, Denham Green, (Hall)	45	35	56/60	44	40	45	46	41	2	1	B	1	G3	T	-	-	-	-	
391014	Broadway, North Orbital Road, Denham, (Restaurant)	45	36	55/58	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	
391014	Broadway, North Orbital Road (General Commercial)	45	36	55/58	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	
391149	Green Tiles Lane, Denham, (Parish Hall)	44	34	54/57	44	40	45	46	41	2	1	B	1	G3	T	-	-	-	-	
391211	Broadwater Park, North Orbital Road, Denham, (Factory)	51	41	62/66	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	
391428	Broadwater Park, Denham, (General Commercial)	51	42	63/67	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	
391453	Global House, North Orbital Road, Denham, (Factory)	54	45	66/69	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	
391453	Denham Media Park, Denham	54	45	66/69	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
	(General Commercial)																			
391453	North Orbital Road, Denham, (Research)	54	45	66/69	44	40	45	46	41	2	1	B	2	G5	T	-	-	-	-	
392473	Broadwater Lane, Harefield, (Shopping)	47	37	55/58	44	40	45	46	41	2	1	B	1	G5	T	-	-	-	-	
396945	Old Uxbridge Road, West Hyde, (General Commercial)	53	43	67/70	45	39	48	48	40	3	2	B	1	G5	T	-	-	-	-	
396991	West Hyde Nursery, (Pre- School Education)	44	35	57/59	53	46	59	53	46	1	0	B	1	G4	T	-	-	-	-	
397281	Coppermill Lane, Rickmansworth, (Shopping)	41	33	52/55	53	46	59	53	46	1	0	B	1	G5	T	-	-	-	-	
397354	Royal Exchange, West Hyde (General Commercial)	43	35	54/56	50	43	59	51	44	1	1	B	1	G5	T	-	-	-	-	
397534	Old Uxbridge Road, Rickmansworth (Youth Centre)	41	33	51/53	53	46	59	55	47	2	1	B	1	G3	T	-	-	-	-	
397534	St Thomas’s Church (church)	41	33	51/53	46	39	67	52	44	6	5	B	1	G3	T	-	-	-	-	\$
399680	Clare House, Coppermill Lane (General Commercial)	42	33	57/59	46	39	67	54	46	9	6	B	1	G5	T	-	-	-	-	\$
402270	Harvil Road, Harefield, (Office)	48	38	57/60	46	39	67	54	46	9	6	B	1	G5	T	-	-	-	-	\$
402270	Moorhall Road, Harefield, (Shopping)	48	38	57/60	52	51	58	53	51	1	0	B	1	G5	T	-	-	-	-	
402669	Widewater Place, Moorhall Road (General Commercial)	52	43	61/65	54	47	56	57	49	2	1	B	1	G5	T	-	-	-	-	
402669	Widewater Place, Moorhall	52	43	61/65	55	47	57	55	47	0	0	B	1	G5	T	-	-	-	-	

Assessment Location		Impact criteria										Significance criteria								Significant effect
ID	Area represented	Proposed Scheme only (Year 15 traffic)			Do nothing (Opening year baseline)			Do something (Opening year baseline + Year 15 traffic) ****		Change		Type of effect	Number of impacts represented	Type of receptor	Receptor design	Existing environment	Unique feature	Combined impact	Mitigation of effect	
		Day *	Night **	Max ***	Day *	Night **	Max ***	Day *	Night **	Day *	Night **									
	Road (General Commercial)																			
402669	Widewater Place, Moorhall Road, Harefield, (Café)	52	43	61/65	51	43	57	51	44	0	0	B	2	G5	T	-	-	-	-	
402669	Widewater Place, Moorhall Road, Harefield, (Office)	52	43	61/65	61	53	68	61	53	0	0	B	1	G5	T	-	-	-	-	
402669	Widewater Place, Moorhall Road, Harefield, (Office)	52	43	61/65	61	53	68	61	53	0	0	B	1	G5	T	-	-	-	-	
402948	Harefield Community Centre, Harefield (Community Centre)	47	38	56/59	61	53	68	61	53	0	0	B	1	G3	T	-	-	-	-	
406180	Uxbridge Golf Course, The Drive, Ickenham, (Shopping)	45	36	56/59	52	51	58	52	51	0	0	B	1	G5	T	-	-	-	-	
408975	Harefield Oil Terminal, Harvil Road, Harefield, (Office)	56	47	68/71	55	50	58	58	52	4	2	B	1	G5	T	-	-	-	-	^
711001	Hillingdon Outdoor Activities Centre (Leisure facility)	66	56	78/81	51	47	53	66	57	14	10	A	1	G5	T	-	-	-	-	OSV07-No2

Direct impact - Summary

4.3.7 The operational airborne noise impacts identified in Table 3 are summarised in Table 4.

Table 4: Summary of operational airborne noise impacts

Receptor	Number of impacts		
	Minor	Moderate	Major
Residential properties	122	27	0
Non-residential properties	1	1	1
Quiet areas	None	None	None

4.4 Assessment of impacts and effects

Residential receptors: direct effects - individual buildings

- 4.4.1 The assessment has identified two residential buildings, 1 – 2 Weybeards Cottages on Old Uxbridge Road, receptor reference 700370, close to the Proposed Scheme where the daytime forecast noise level does not exceed the threshold set in the Regulations but the forecast night-time noise level will exceed the World Health Organization's Interim Target of 55dB² Error! Bookmark not defined., or the maximum noise level (dependent on the number of train passes) as a train passes exceeds the criterion³ Error! Bookmark not defined.. It is estimated that these buildings will also be offered noise insulation as described in the Avoidance and mitigation measures section of Volume 2 Report 07. These buildings are indicated on Map Series SV-02 (Volume 5, CFA7 Map Book) and OSVo7-Do1 in Table 3.
- 4.4.2 The mitigation measures including noise insulation will reduce noise inside all dwellings, including those at Weybeards Cottages, such that it will not reach a level where it would significantly affect residents.

Residential receptors: direct effects - communities

- 4.4.3 The mitigation measures in this area will avoid airborne noise adverse effects on the majority of receptors, and at the majority of the following communities:
- Denham Green; and
 - South Harefield

² Equivalent continuous level, $L_{pAeq,23:00-07:00}$ measured without reflection from the front of buildings

³ During the night (2300-0700) a significant effect is identified where the Proposed Scheme results in a maximum sound level at the façade of a building at or above: 85 dB L_{pAFmax} (where the number of train pass-bys exceeding this value is less than or equal to 20); or 80 dB L_{pAFmax} (where the number of train pass-bys exceeding this value is greater than 20).

- 4.4.4 Taking account of the envisaged mitigation, Map Series SV-02 (Volume 5, CFA7 Map Book) shows the long term 40dB⁴ night-time sound level contour from the operation of the new railway within the Proposed Scheme. The extent of the 40dB night-time sound level contour is equivalent to, or slightly larger than, the 50dB daytime contour⁵. In general, below these levels adverse effects are not expected.
- 4.4.5 Above 40dB during the night and 50dB during the day the effect of noise is dependent on the baseline sound levels in that area and the change in sound level (magnitude of effect) brought about by the Proposed Scheme. The airborne noise impacts and effects forecast for the operation of the scheme are presented on Map Series SV-02 (Volume 5, CFA7 Map Book).
- 4.4.6 The changes in noise levels are likely to affect the acoustic character of the area such that there is a perceived change in the quality of life and are considered to be significant when assessed on a community basis taking account of the local context.
- 4.4.7 At Harefield approximately 45 properties have been identified as being subject to a minor adverse noise effect. These effects are likely to be considered by the local community as an effect on the acoustic character of the area such that there is a perceived change in the quality of life. The level of noise exposure with the Proposed Scheme in operation is relatively low for an urban location already subject to Transport noises. Considering the impact on the noise amenity outside the dwellings, the number of impacts and the grouping of impacts, and the current baseline sound levels, the effects are not considered to be significant.
- 4.4.8 Five isolated properties within the area have been identified as being subject to an observed adverse noise effect; these effects are likely to be considered as an effect on the acoustic character of the area such that there is a perceived change in the quality of life. However, as the affected properties are spatially remote from larger defined residential areas, are subject to smaller magnitudes of noise effect, or are small in number, the effects are not considered to be significant.
- 4.4.9 The direct adverse effects⁶ on the areas of the residential communities identified in Table 5 are considered to be significant.

Table 5: Direct adverse effects on residential communities and shared open areas that are considered significant on a community basis

Significant effect number (see Map series SV-02 and Tables 1 and 3)	Source of significant effect	Time of day	Location and details
OSV07-C01	Airborne noise increase from new train services	Daytime and night-time	Approximately 15 dwellings in the vicinity of Savay Lane, Denham Green, closest to the Proposed Route. Forecast increases in sound from the railway are likely to cause a moderate adverse effect on the acoustic character of the area around the closest properties and

⁴ Defined as the equivalent continuous sound level from 23:00 to 07:00 or $L_{pAeq,night}$

⁵ With the train flows described in the assumptions section of this CFA Report, the daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or $L_{pAeq,day}$) from the Proposed Scheme would be approximately 10dB higher than the night-time sound level. The 40dB contour therefore indicates the distance from the Proposed Scheme at which the daytime sound level would be 50dB.

⁶ Information is provided in the emerging National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk>

Significant effect number (see Map series SV-02 and Tables 1 and 3)	Source of significant effect	Time of day	Location and details
			a minor adverse effect on the acoustic character of the area around of residential areas that are located further from the railway. The nearby external amenity space that is available to residents will also be adversely affected.
OSV07-Co2	Airborne noise increase from new train services	Daytime and night-time	Approximately 85 dwellings (caravans and park houses) in the vicinity of Wyatt's Covert. Forecast increases in sound from the railway are likely to cause a moderate adverse effect on the acoustic character of the area around the closest park houses and a minor effect at the caravans further away, that over the community may be perceived as an adverse effect on quality of life. The nearby external amenity space that is available to residents will also be adversely affected.
OSV07-Co3	Airborne noise increase from new train services	Daytime and night-time	Approximately 5 dwellings in the vicinity of Denham Grove (De Vere Hotel). Forecast increases in sound from the railway are likely to cause a moderate adverse effect on the acoustic character of the area around the dwellings nearest to the route and minor effect on those on the other side of Tilehouse Lane.

Residential receptors: indirect effects

- 4.4.10 The transport assessment presented in Volume 5: Appendix TR-001-000, has been used to identify those roads or railways within this study area where the alignment remains as at present, but a change in flow or composition is identified which is greater than the screening criteria defined in Volume 5: Appendix SV-001-000. No roads or railways which exceed the criteria defined in Volume 5: Appendix SV-001-000 have been identified in this study area.
- 4.4.11 The assessment of operational noise and vibration indicates that significant indirect effects on residential receptors are unlikely to occur in this area.

Non-residential receptors: direct effects

- 4.4.12 The assessment has identified airborne noise impacts at Denham Grove (De Vere) Hotel, Hillingdon Outdoor Activities Centre, the offices at Harefield Oil Terminal and Harefield Marina, represented by receptor references 389194, 711001 and 408975.

Denham Grove

- 4.4.13 A moderate operational noise impact has been identified based upon the change in the airborne noise level outside this receptor, reference 389194. An assessment has been undertaken to determine if this impact would result in a likely significant effect at this non-residential receptor, using the significance criteria detailed in Volume 5: Appendix 001-000.

- 4.4.14 The Denham Grove Hotel is operated by De Vere, and is located approximately 175 m from the route. The main elevations are two storeys constructed from masonry. The fenestration is double glazed windows. It is assumed that ventilation is provided by opening the windows.
- 4.4.15 Further assessment work has been undertaken which confirms the operational sound impact and likely significant observed adverse effect at the Denham Grove Hotel, denoted by OSV07-No3 in Table 1 and drawing SV-02-007 (see CFA07 Volume 5 sound, noise and vibration map book). This may take the form of the disturbance of activities inside the building.

Hillingdon Outdoor Activities Centre (HOAC)

- 4.4.16 A major impact has been identified based upon the change in the airborne noise level outside this receptor, reference 711001. An assessment has been undertaken to determine if this impact would result in a likely significant effect at this non-residential receptor, using the significance criteria detailed in Volume 5: Appendix 001-000.
- 4.4.17 The Hillingdon Outdoor Activities Centre buildings are used as offices, to store equipment and undertake briefings prior to the commencement of activities on the lake. The main elevations are two storeys constructed from masonry. The windows are believed to be single glazed and ventilation is provided by opening the windows.
- 4.4.18 Further assessment work that has been undertaken confirms the operational sound impact and likely significant observed adverse noise effect at the Hillingdon Outdoor Activities Centre, denoted by OSV07-No1 in Table 1 and drawing SV-02-007 (see CFA07 Volume 5 sound, noise and vibration map book). This may take the form of the disturbance of activities inside the building.

Harefield Oil Terminal

- 4.4.19 A minor impact has been identified based upon the change in the airborne noise level outside this receptor, reference 408975. An assessment has been undertaken to determine if this impact would result in a likely significant effect at this non-residential receptor, using the significance criteria detailed in Volume 5: Appendix 001-000.
- 4.4.20 Harefield Oil Terminal is an industrial facility accessed from Harvil Road. The offices are within a lightweight single storey building which is assumed to be fitted with single glazed windows which are opened to provide ventilation. The current activities on the site include a large number of heavy vehicle movements in close proximity to the offices and other noisy activities.
- 4.4.21 The incident sound levels from the Proposed Scheme within the offices are not likely to result in activity disturbance compared to existing event noise levels, and therefore, the impact at this non-residential receptor will not result in a significant observed adverse noise effect at this receptor.

Summary

- 4.4.22 The assessment of operational noise and vibration indicates that significant effects are likely on the non-residential receptors identified in Table 6.
- 4.4.23 The assessment of effects on non-residential receptors has been undertaken on a reasonable worst case basis taking account of all the public information about each receptor. Further information can be found, Volume 5: Appendix SV-004-007.

Table 6: Likely significant noise or vibration effects on non-residential receptors arising from operation of the Proposed Scheme

Significant effect number (see Map series SV-02 and Tables 1 and 3)	Type of effect and source	Time of day	Location and details
OSV07-No1	Minor risk of disturbance of hotel activities ⁷ inside due to the operation of train services and adverse effects on the acoustic character of the area around the hotel ⁸ .	Daytime and night-time	Denham Grove (De Vere Hotel), Tilehouse Lane
OSV07-No2	Minor risk disturbance of activities ⁷ inside office buildings.	Daytime and night-time	HOAC, Dews Lane.

Non-residential receptors: indirect effects

- 4.4.24 The transport assessment presented in Volume 5: Appendix TR-001-000, has been used to identify those roads or railways within this study area where the alignment remains as at present, but a change in flow or composition is identified which is greater than the screening criteria defined in Volume 5: Appendix SV-001-000. No roads or railways which exceed the criteria defined in Volume 5: Appendix SV-001-000 have been identified in this study area.
- 4.4.25 The assessment of operational noise and vibration indicates that significant indirect effects are unlikely to occur on non-residential receptors in this area.

Cumulative effects

- 4.4.26 Details of properties being currently developed which were afforded planning approval before the safeguarding date are presented in Volume 5: Appendix CToo4-000. Within this area, the operational sound, noise or vibration associated with these developments in conjunction with the operation of the Proposed Scheme do not result in any significant cumulative effects.

⁷ Activity disturbance, especially for activities that require good conditions for verbal communication

⁸ National Planning Practice Guidance – Noise <http://planningguidance.planningportal.gov.uk> ; and the table summarising noise exposure hierarchy